progressive attenuation, and is not marked on any published map.

In this case the streams are nearly at right angles to each other when discharged; another instance, however, seems to be furnished in a neighbouring loch, Grön Lake, in which they are collateral. Krefting's map (1868) represents the loch as bifurcating at its north-east end, each of the inlets giving rise to a stream; they seem about two miles apart, are marked by lines of about equal thickness, and flow nearly parallel to the Trondjhem fjord near Mosvigen.

I believe that instances of a like nature with these are by no means rare in Norway. I know at least one lake near Trondjhem, which at a former period seems to have had a double outfall, and many others in which, were the existing outlet dammed by a moraine twenty to fifty feet high, the water would find one or several openings elsewhere.

I have indeed noted several instances of lakes with two outfalls upon Prof. Munch's large map of Norway (1845), but failing to discover any confirmation in other maps, and finding it in other respects unreliable upon matters of such detail, I can assign no value to them.

It would be a fact of curious significance, as bearing upon Prof. Ramsay's theory of the glacial origin of lakes, if most authenticated instances of lakes with several outfalls could be referred to districts which have been traversed by a continuous sheet of glacier ice. When glaciers were confined within valley boundaries, as in Britain, their force was of necessity concentrated along lines, but upon level tracts or plateaux they were free to scoop wherever circumstances favoured erosion. Should it prove that Norway, North America, and Lapland give us the majority of lakes with several outfalls, no other theory can explain the fact.

St. James's Park, S.W. HUGH MILLER

Trees "Pierced" by other Trees

COLONEL GREENWOOD'S answer (NATURE, vol. ix. p. 463) to Mr. J. J. Murphy encourages me to mention a botanical phenomenon which I witnessed in 1865, but have scarcely ever mentioned before for fear of being disbelieved. I was standing on the bank of the little river Evenlode, in Oxfordshire, looking at an old pollard willow trunk about six feet high, when I observed in the decayed wood of the tree an upright sort of staff resembling a dark-coloured old school ruler, and of about that size. I knocked away some of the touchwood above and below, and found my ruler lengthened each way. At the point where it would naturally issue at the top, I found a small twig of undoubted ash, of which the leaves were fully expanded, sprouting up among the branches of willow. Upon clearing away a little more rotten wood I laid bare another ruler, which, like the first, appeared to lengthen upward to the top of the trunk and downward to the ground, but there was no second twig of ash above. The "rulers" were rough where they were totally enclosed by the willow, and had put forth little threadlike rootlets. But the part which I found exposed to the air was smoother and looked like a true branch, but was darker than the usual colour of ash. I afterwards drew the proprietor's attention to the tree, but he could not suggest any explanation. I daresay it is there and in the same condition to this day; if anyone wished it, I could easily describe where it might be found. One explanation I have had offered is, that an ash-seed had fallen down a deep crack in the willow. But there was no sign of such a crack—no crack-like cavity—one of the "rulers" being totally and closely enveloped with the rotten wood, and the other very nearly so. Whether it would have been possible for an ash-seed to germinate in a crack which must have been at least four feet deep and probably much deeper, and was open at the top only and was certainly no larger than the shoot which it formed, is a question I must leave to botanists. Another explanation was, that as ash-roots travel for a considerable distance underground, it was possible that two such roots, finding suitable pabulum in the rotten trunk of the willow, had turned upwards. But this also I must leave to men of science, and notably to Col. Greenwood. T. S.

PROF. TAIT ON "CRAM"

ON Wednesday, the 22nd inst., at the ceremony of capping the Graduates in Arts of Edinburgh University, Prof. Tait gave an address in which he touched on various subjects of Academical interest. On the subject of "Cram" he spoke as follows:—

"It is a mere common-place to say that examination, or, as I have elsewhere called it, artificial selection is, as too often conducted, about the most imperfect of human institutions; and that in too many cases it is not only misleading, but directly destructive, especially when proper precautions are not taken to annihilate absolutely the chances of a candidate who is merely crammed, not in any sense educated. Not long ago I saw an advertisement to the effect:—'History in an hour, by a Cambridge *Coach*.' How much must this author have thought of the ability of the examiners before whom his readers were to appear? There is one, but so far as I can see, only one, way of entirely extirpating cram as a system, it may be costly—well, let the candidates bear the expense, if the country (which will be ultimately the gainer) should refuse. Take your candidates, when fully primed for examination, and send them off to sea—without books, without even pen and ink; attend assiduously to their physical health, but let their minds lie fallow. Continue this treatment for a few months, and then turn them suddenly into the Examination Hall. Even six months would not be wasted in such a process if it really enabled us to cure the grand inherent defect of all modern examinations. It is amusing to think what an outcry would be everywhere raised if there were a possibility of such a scheme being actually tried—say in Civil Service Examinations. But the certainty of such an outcry, under the conditions supposed, is of itself a complete proof of the utter abomination of the cramming system. I shall probably be told, by upholders of the present methods, that I know nothing about them, that I am prejudiced, bigoted, and what not. That, of course, is the natural cry of those whose 'craft is in danger'—and it is preserved for all time in the historic words, 'Thou wert altogether born in sin, and dost thou teach us?' I venture now to state, without the least fear of contradiction, a proposition which (whether new or not) I consider to be of inestimable value to the country at large:—Wherever the examiners are not in great part the teachers also, there will cram to a great extent supersede education. I need make no comment on this, beyond calling your particular attention to the definite article which twice occurs in the sentence, and which gives it its peculiar value.

"I said, in my former address [eight years ago], that 'coaching' seems quite natural to all who are engaged in it, and, in particular, that it did so to myself more than twenty years ago. This shows that it is possible that something akin to the results of the profound speculations of Riemann, Helmholtz, and others, may hold in the moral if not in the physical universe. It is probably new to most of my audience to hear that very great authorities are as yet in doubt whether the properties of space itself are the same in different localities; whether, in short, in our rapid flight through space, we may not be insensibly getting into a region, our existence in which will involve a gradual change of form, in order that our physical substance may continue to fit the varying circumstances of our position. Assume that something like this holds in the world of mind, and you see at once how the same man may, while residing in Edinburgh, honestly denounce certain methods as wholly pernicious which a few years' residence in Cambridge may invest in his eyes with a perfection more than human. I do not say that this is an explanation; but the analogy is at least worthy of remark; and I leave further discussion of it to my old friend Mr. Todhunter, who, living in the middle of that singular region, tells me he thoroughly agrees with me in my main arguments against examinations, and then soundly rates me for my mode of propounding them."

After advocating the restoration of the B.A. degree to Edinburgh University, Prof. Tait spoke in forcible terms

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against the centralisation of our various Universities, Licensing Boards, &c, "with its inevitable acolyte cram." He illustrated in an original and striking way what he thinks would be the inevitable result of centralisation, by referring to the dead and motionless uniformity which must be the result of the degradation of energy. Prof. Tait drew a ludicrous yet melancholy picture of what would be the results of universal uniformity in the social world.

"The application of these ideas," he said, "to political and social questions, among which of course comes University centralisation, is not far to seek. What would the world of men be without what we may call 'social entropy'? Everyone would then be his own farmer, baker, butcher, brewer, banker, boot-black, &c.—all would be at the same dead level—no possible help from one to his neighbour, even if it could be required; no distribution of tasks, and therefore (in every department) that endless waste which is inevitable in operations conducted on a petty scale. No possibility of that mutual reliance and assistance which forms the friendships we delight in, none of that variety which is the real charm of life—no idea which would not simultaneously strike every unit of the race—no news, no books—nothing but sameness! None of the pleasure of being able to assist struggling worth, none of gratitude for generous aid. Nay, we might pursue it further. No difference of temper, character, tendencies, age, sex—a state lower than the lowest known in vegetation; but here the end must come. Or, to take a somewhat different point of view (though the basis is absolutely the same, for oscillation implies entropy), what if everything were always at its average value? Never absolutely either fair or rainy weather, clear or cloudy, calm or stormy, hot or cold; but a dead average. Never either absolutely day or night; no tides, no seasons; men never either absolutely awake nor absolutely asleep—continually in a semi-lethargic state—half happy, half discontented; half playful, half serious—neither running, walking, standing, sitting, nor lying, but a perpetual average. No catastrophes such as a birth, a marriage, or a death—no distinction between man and man—nothing of that variety which is the law of nature. Eternal, hideous, intolerable sameness, by necessity devoid of all capacity for action: the human race turned into a set of Nürnberg toy-solders, all cast in the same mould, of the same base material, and all similarly bedaubed from the same glaring paint-pots, and moving on the same lazy-tongs with the same relative velocities. No one to advise you in a difficulty, no one in whose superior strength of mind or body you could confide; nothing around you except what you feel must be but the image of yourself (as you will early have learned introspectively to look at it)—mean, sordid, and grovelling! No one whom you can respect, none to trust—all, like yourself, vile and despicable! Here I would gladly say—'Enough of such horrors,' and quit the disgusting theme. But, unfortunately, the application has still to come. It will be found very pertinent to many things which have been of late evolved from the innermost consciousness of statecraft, and hailed, with altogether inexplicable delight, by what seemed (till lately) to be at least a numerical majority of the representatives of our countrymen."

Prof. Tait then referred to the late Prof. Forbes and the recent discussion concerning his character and work. For what Prof. Tait has to say on this subject we must refer our readers to his address, which is printed in full in the *Scotsman* of the 23rd inst. He then spoke of the scheme for extending Edinburgh University, and the facilities which would thereby be acquired for teaching Science practically, as it ought to be taught, and thus tend to extinguish "paper-science," a term which "conveys to all who are really scientific men an impression of the most unutterable contempt." In conclusion, Prof. Tait referred to the difficulties attending the work of his own class, that of "Natural Philosophy," arising from the want of adequate means. He hopes to be able, at least, to put the Natural Philosophy Department in Edinburgh University on a proper footing for his successor.

THE SOIRÉE OF THE ROYAL SOCIETY

ON Wednesday, April 22, the first soirée of the Royal Society since their removal into their new apartments was given by the President, Dr. Hooker, and came off with the greatest *éclat*. There was a remarkably good display of scientific apparatus, and we think that the interdependence of theman of Science and of the manufacturer of instruments is at no time better exemplified than on occasions like the present. The apartments devoted to the purposes of exhibition were thronged by the most eminent in the various branches of Science—it might have been said with reason that a considerable fraction of the nation's mind had centred for the time being in the rooms at Burlington House. Not as an unhealthy sign either did we regard the presence of Archbishop Manning and the attention shown towards that divine by scientific men of the very opposite poles of thought.

Of the objects of interest displayed in the six rooms devoted to this purpose we can here only give details of the more prominent. In the first room several maps and photographs were exhibited by the Royal Geographical Society; also some splendid pieces of glass-work by Messrs. Chance, consisting of a dioptric fixed light (4th order) with nine prisms and six rings of lenses in four panels, a segment of a dioptric totally reflecting mirror first proposed by Mr. Thomas Stevenson, C.E., a dioptric holophote designed by the same engineer, and a lamp-burner designed by Mr. J. N. Douglass, C.E., with six concentric wicks. This burner can be used either for colza oil or for petroleum. The President exhibited also in this room some interesting objects from the Kew Museum. Amongst these we noticed some fossil copal gums from Zanzibar, carved cocoa-nut shells from the Fiji Islands, a vase made from the ash of *Moguilea utilis*, mixed with clay, from Parà, and different chemical and medical products from species of *Eucalyptus*.

In the second room Mr. Crookes exhibited his experiments showing the attraction and repulsion accompanying radiation. The pendulum described by Mr. Crookes in his communication to the Society was exhibited under various forms, and the experiments excited the liveliest interest. Here also Dr. C. J. B. Williams exhibited some new ear-trumpets, and Messrs. Whitehouse and Latimer Clark an electrical recorder for registering time, speed, distance, and number of passengers inside and out in tram-cars and omnibuses. This information is registered in four parallel columns in red ink on long strips of paper, by automatic pens.—Mr. Vernon Heath exhibited some autotype landscapes, and the president some Tappa dresses from Fiji, which reminded us strongly of the ornaments placed in our fire-stoves during the summer. Here also we were shown a microscope by Messrs. Powell and Lealand, with a $\frac{1}{50}$ immersion objective and the eternal Podura scale.

In the third room, the Entrance Saloon, were some exquisitely coloured drawings of the flora of Brazil, and landscapes by Miss North; likewise some coloured drawings of New Zealand birds, exhibited by Dr. W. Lawry Buller. The pair of new Paradise Birds collected by Signor D'Abertis* in New Guinea, promised by Dr. Sclater, was not exhibited.

In the fourth room, the Reading Room, Dr. Tyndall exhibited the apparatus (already described in our columns) for showing the stoppage of sound by a non-homogeneous mixture of air and vapours, and also experiments illus-

* See NATURE, vol. viii. p. 305.

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